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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/849,213	05/04/2001	Hsiao-Dong Chiang	CIG-1	9034

20808 7590 12/14/2004

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EXAMINER	
BRODA, SAMUEL	

ART UNIT	PAPER NUMBER
2123	

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/849,213	CHIANG, HSIAO-DONG	
	Examiner	Art Unit	
	Samuel Broda	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 May 2001 and 10 August 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *13-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 May 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4 September 2001*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 13-40, submitted in a Preliminary Amendment dated 10 August 2001 and canceling claims 1-12, have been examined.

Specification

2. The substitute Specification and the "Marked-up Copy of Replacement Specification" submitted as part of the Preliminary Amendment are objected to because:

(1) the substitute Specification does not show the changes relative to the 'marked-up copy' when compared to the original Specification; and

(2) the 'marked-up copy' includes handwritten comments describing changes and does not conform to 35 C.F.R. 1.121 and 1.125(c).

For example, a comparison of the original Specification at pages 25-26 describing equations (4.5) and (4.6), to the 'marked-up copy' at pages 25-26, does not yield the text of the substitute Specification at pages 25-26. The text appearing at the top of page 26 of the 'marked-up copy' should be underlined if Applicants intend to add it as new text; similarly, if this text is taken from another part of the original Specification, this text should appear deleted in its original location.

A corrected marked-up Specification that clearly illustrates the changes made between the original Specification and the substitute Specification is required.

Claim Objections

3. The following is a partial quotation of 37 CFR § 1.75:

...

(g) The least restrictive claim should be presented as claim number 1, and all dependent claims should be grouped together with the claim or claims to which they refer to the extent practicable.

3.1 Claims 13-40 are objected to under 37 CFR § 1.75(g) because dependent claims do not appear grouped together, making the claim groups difficult to follow. There appears no logical reason for the current claim groupings and numbering. Correction is required.

Claim Rejections - 35 U.S.C. § 112, Second Paragraph

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4.1 Claims 28-31 and 37-38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

4.2 Claims 28-31, 33, and 36-39 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are the steps that take the local optimal solutions and determine a global optimal solution, as recited in the preamble of independent claim 28. Dependent claims 29-31 and 33 share this omission.

4.3 Regarding claims 37-38, the following terms in these claims appear to lack antecedent basis:

Claim #	Term
37 step c)	"the objective function (0) of (4.5)"
38 step c)	"the hybrid search method"
38 step g)	"manifold of system (4-9)"
38 step h)	"for Phase using"

Claim Rejections - 35 U.S.C. § 101

5. The following is a quotation of 35 U.S.C. 101:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5.1 Method claims 13-40 are rejected for reciting a process that is not directed to the technological arts.

5.2 Regarding claim 13, this claim is directed to obtaining a global optimal solution of general nonlinear programming problems. To be statutory, the utility of an invention must be within the technological arts. *In re Musgrave*, 167 USPQ 280, 289-90 (CCPA, 1970). The definition of "technology" is the "application of science and engineering to the development of machines and procedures in order to enhance or improve human conditions, or at least to improve human efficiency in some respect." (Computer Dictionary 384 (Microsoft Press, 2d ed. 1994)).

The limitations recited in claim 13 contain no language suggesting that claim 13 is intended to be within the technological arts; please note that the method steps of claim 13 recited as part of a "computer-implemented method" would be considered as directed to the technological arts.

5.3 Regarding independent claims 14-15, 22-23, 28, 32, 34, and 35 and their corresponding dependent claims, and claims dependent on claim 13, these claims are rejected under the same analysis.

5.4 Method claims 13-40 are rejected for reciting a process comprising an abstract idea.

5.5 Regarding claim 13, this claim is directed to "a method for obtaining a global optimal solution of general nonlinear programming problems," and the steps recited in claim 13 describe the abstract idea of finding local optimal solutions used to find a global optimal solution. These steps do not: (1) recite data gathering limitations or post-mathematical operations that might independently limit the claims beyond the performance of a mathematical operation; or (2) limit the use of the output to a practical application providing a useful, concrete, and tangible result.

5.6 Regarding independent claims 14-15, 22-23, 28, 32, 34, and 35 and their corresponding dependent claims, and claims dependent on claim 13, these claims are rejected under the same analysis.

Claim Rejections - 35 U.S.C. § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> . . .
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6.1 Claims 13-15, 22, 24, and 32-35 are rejected under 35 U.S.C. 102(b) as being anticipated by Chiang et al, "A Systematic Search Method for Obtaining Multiple Local Optimal Solutions of Nonlinear Programming Problems" (prior art supplied by Applicant).

6.2 Regarding claim 13, Chiang et al teaches a method for obtaining a global optimal solution of a general nonlinear programming problem, comprising:

a) in a deterministic manner, first finding all local optimal solutions [Example 1, pages 105-106 (including Tables I-II), in which local optimal solutions found using the negative gradient system]; and

b) then finding from said local optimal solutions a global optimal solution [Example 1, pages 105-106 (including Tables I-II), in which the global optimal solution is found using the local minima and decomposition points].

Therefore, Chiang et al anticipates claim 13.

6.3 Regarding claims 14, 22, and 32, each claim is anticipated using the analysis of claim 13 above. The claimed conditions (C1) and (C2) are inherent in the formulation of

Liapunov functions; see Appendix, pages 107-108, especially the proof of Proposition 4, page 108, column 1.

6.4 Regarding claims 15 and 23, these claims are anticipated using the analysis of claim 13 above, in conjunction with the algorithm shown at page 105 under the heading "An Algorithm to Compute Decomposition Points."

6.5 Regarding claim 24, the method of Chiang et al teaches each of the five beneficial results cited in the claim.

6.6 Regarding claims 28-31, and 33-35, each claim is anticipated using the analysis of claim 13 above in conjunction with the two method steps illustrated in Chiang et al in Example 1 appearing on pages 105-106, with feasible components corresponding to decomposition points. Additionally, the "Concluding Remarks" in Chiang et al at page 107 describes the method steps of approaching a feasible component or a stable equilibrium manifold and then escaping from that point using the unstable manifold of the decomposition point.

Claim Rejections - 35 U.S.C. § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7.1 Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chiang et al, in view of common knowledge regarding optimization.

7.2 Regarding claim 27, the method of Chiang et al does not appear to teach the transformation of a constrained nonlinear programming problem into an unconstrained optimization problem. Official Notice is taken that the transformation of constrained optimization problems into unconstrained problems is old and well known the field of optimization. Such a transformation is accomplished using penalty functions and/or slack variables.

It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to incorporate the transformation of constrained optimization problems into unconstrained problems for solution using the methods of Chiang et al, because such a transformation would permit the solution of a wider variety of real-world problems.

Allowable Subject Matter

8.1 Claims 16-21, 25-26, and 40 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 101, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

8.2 Claims 36-39 would be allowable if rewritten to overcome the rejection(s) under both 35 U.S.C 101 and 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure. Reference to Lee et al, "Quotient Gradient Methods for Solving Constraint Satisfaction Problems," 2001 IEEE International Symposium on Circuits and Systems, Vol. 2, pp. 365-368 (May 2001)(co-authored by Applicant), is cited as teaching the theoretical basis of stability theory for a class of non-hyperbolic dynamical systems.

Reference to Rantzer et al, "On Convexity in Stabilization of Nonlinear Systems," Proceedings of the 39 IEEE Conference on Decision and Control, Vol. 3, pp. 2942-2945 (December 2000), is cited as teaching a stability criterion for nonlinear systems that flows along system trajectories towards the equilibrium.

Reference to Champsaur et al, "Stability Theorems With Economic Applications," Econometrica, Vol. 45 No. 2, pp. 273-294 (March 1977), is cited as teaching a review of Lyapunov (Liapunov) function having quasi-stability and used to establish the stability of the Malinvaud-Drèze-de la Vallée Poussin process.

10. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Samuel Broda, whose telephone number is (571) 272-3709. The Examiner can normally be reached on Mondays through Fridays from 8:00 AM – 4:30 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kevin Teska, can be reached at (571) 272-3716. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist, whose telephone number is (571) 272-2100.

SAMUEL BRODA, ESQ.
PRIMARY EXAMINER